Practitioner's Docket No.: 283_237.10CPA *PATENT*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Robert J. Hennick, et al.

Ser. No.: 09/312,479 Group Art Unit: 2878

Filed: May 17, 1999 Examiner: Luu, Thanh X

For: OPTICAL AND IMAGE SENSOR SUBASSEMBLY ALIGNMENT AND MOUNTING METHOD

I hereby certify that this paper is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 addressed to **Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450** on January 20, 2006, under "EXPRESS MAIL" mailing label number EV554213033US

Christine M. Holmes

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

SUPPLEMENTAL APPEAL BRIEF

This application is before the Honorable Board of Appeals on appeal from the final rejection by the Examiner dated January 8, 2003, wherein claims 1-37 and 45-108 were finally rejected.

I. REAL PARTY IN INTEREST

An assignment of the invention claimed in this application from the Appellant to Welch Allyn, Inc., is recorded in the U.S. Patent and Trademark microfilm records at Reel 010174, Frame 0258. A further assignment was made from Welch Allyn, Inc., to Welch Allyn Data Collection, Inc., which assignment was recorded in the U.S. Patent and Trademark microfilm records at Reel 010154, Frame 0790. Accordingly, the real party in interest is Welch Allyn Data Collection, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no other prior or pending appeals interferences or judicial proceedings known to Appellant, the Appellant's legal representative, or assignee which are related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-37 and 45-108 are pending in the application. The rejections of Claims 1-25, 30-37 and 45-108 are appealed. Claims 26-29 are withdrawn from appeal. The claims are set forth in the Appendix to this brief.

IV. STATUS OF AMENDMENTS

An Amendment after Final Rejection was filed on January 23, 2003, but it was not entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention comprises a method and apparatus for establishing a desired spacial relationship between an image sensor subassembly 14 and an optical subassembly 12. That desired relationship is not necessarily a fixed distance between the two components but will tend to vary even with the same batch components. Accordingly the desired relationship is determined by the actual performance of the components as they are selectively spacially moved until a desired image quality results. At that time, the relative positions are fixed by a soldering cross hair. However, at the time the soldering occurs, the two components are not limited in their movement toward each other but are free to be moved until they arrive at the point where to proper performance is obtained.

The independent claims are set forth with reference being made to the specification and drawings as follows:

1. A method for mounting an optical subassembly (12) of an optical reading device (10) to an image sensor subassembly (14) of an optical device, said method comprising the steps of:

moving said optical subassembly (12) and said image sensor subassembly (14) in proximity with one another (page 5, lines 17-19); and

soldering said optical (12) and image sensor (14) assemblies together using a solder material (page 12, lines 3-8), wherein at the time of said soldering step there is no contact between said optical subassembly and said image sensor subassembly that prevents free movement of said optical subassembly and said image sensor subassembly in either of a vertical or a horizontal direction (page 18, lines 12-23; page 20, lines 1-3).

The method involves moving the optical subassembly (12) in proximity to the image sensor subassembly as described on page 5, lines 17-19 of the specification, and, at a time when the two subassemblies are free to be relatively moved, soldering the two together.

13. A method for mounting an optical subassembly (12) to an image sensor subassembly (14), said method comprising the steps of:

forming at least one solderable surface on at least one of said optical and image sensor subassemblies (page 14, lines 5-9);

moving said optical subassembly in proximity with said image sensor subassembly (page 5, lines 17-19) to define an interface delimited by said at least one solderable surface of said optical subassembly (12) or said image sensor (14) subassembly; and

soldering said optical subassembly and said image sensor subassembly together at said interface (page 12, lines 3-8) , wherein said optical subassembly and said image sensor subassembly are configured so that said image sensor subassembly and said optical subassembly can be moved freely relative to one another in at least either of a vertical or a horizontal direction immediately prior to said soldering step (page 18, lines 12-23; page 20, lines 1-3).

This method involves the steps of forming at least on solderable surface on either an optical subassembly or an image sensor subassembly, moving the two subassemblies into proximity of each other to define an interface delimited by the solderable surface, and at a time when the two subassemblies are relatively movable in at least a vertical or horizontal direction, soldering the two together.

32. An optical subassembly comprising:

a substantially rigid member (20);

an optical element (12) disposed on said substantially rigid member (20); and

a solderable surface formed on said substantially rigid member (page 12, lines 3-8) (page 14, lines 17-19), said solderable surface being of a configuration selected from the group consisting of a hole, pin, or threaded screw (page 16, lines 14-19).

This is an apparatus claim that recites a rigid member having an optical element disclosed thereon and a solderable surface formed thereon, with the solderable surface being selected from a group consisting of a hole, pin or threaded screw as described on page 16, lines 14-19.

46. A method for making an optical (12) and image sensor assembly (14), said image sensor assembly (14) comprising an optical image sensor subassembly and an image sensor subassembly, said method comprising the steps of:

aligning said optical subassembly (12) and said image sensor subassembly (14) relative to one another without contacting said optical subassembly (12) and said image sensor subassembly (14) against one another in a manner that prevents free movement of said subassemblies relative to one another in either of a vertical or a horizontal direction (page 18, lines 12-23; page 20, lines 1-3); and

when said optical subassembly and said image sensor assembly are properly aligned, securing said optical subassembly and said image sensor subassembly together (page 12, lines 3-8).

This is a method claim that recites the step of aligning an optical subassembly with an image sensor subassembly without the two contacting each other and, at a time when they are free to be relatively moved in a vertical or horizontal direction, and are aligned, securing the two together as recited on page 12, lines 3-8.

59. An imaging device comprising:

an image sensor subassembly (14) including an image sensor mounted on a printed circuit board (PCB);

a substantially rigid optical subassembly (12), said optical subassembly including an optical element (12) disposed on a substantially rigid member (16);

at least one solderable surface formed on either of said printed circuit board or said optical subassembly defining at least one solder receiving interface between said printed circuit board and said optical subassembly (page 14, lines 5-9); and solder material for bonding said subassemblies disposed at said at least one solder-receiving interface (page 12, lines 3-8; page 14, lines 17-19).

This is an apparatus claim reciting an image sensor subassembly that includes an image sensor mounted on a printed circuit board, a rigid optical subassembly that includes an optical element disposed therein, a solderable surface formed on either the printed circuit board or the optical subassembly and a solder material for bonding the subassemblies at the solderable surface as described on page 12, lines 3-8 and page 14, lines 17-19.

66. An imaging device comprising:

an image sensor subassembly (14) including an image sensor mounted on a printed circuit board (PCB);

a substantially rigid optical subassembly (12), said optical subassembly having a single receive optical axis and including an optical element disposed on a substantially rigid member (16);

at least one solderable surface formed on either of said image sensor subassembly or optical subassembly (page 14, lines 5-9) defining at least one solder receiving interface between said image sensor subassembly (14) and said optical subassembly (12); and

solder material for bonding said subassemblies disposed at said at least one solder-receiving interface (page 12, lines 3-8; page 14, lines 17-19).

This is an apparatus claim that recites an image sensor subassembly that includes an image sensor mounted on a printed circuit board, a rigid optical subassembly that has a single receive optical axis and includes an optical element disposed thereon, a solderable surface on one of the sensor subassembly or optical subassembly and defining a solder receiving interface between the two subassemblies, and a solder material for bonding the two subassemblies at the solder receiving interface as described on page 12, lines 3-8 and page 14, lines 17-19.

73. An optical reading device comprising:

an optical (12) and image sensor (14) assembly including

an image sensor subassembly (14) including an image sensor mounted on a substantially rigid planar member (20),

an optical subassembly (12), said optical subassembly including an optical element disposed on a substantially rigid member (16),

at least one solderable surface formed on either of said optical subassembly or said substantially rigid planar member defining at lease one solder receiving interface between said substantially rigid planar member and said optical subassembly (page 14, lines 5-9),

solder material for bonding said subassemblies disposed at said at least one solder-receiving interface (page 12, lines 3-8; page 14, lines 17-19),

a housing (10), said optical and image sensor assembly being disposed in said housing.

This is an apparatus claim reciting an image sensor subassembly that includes a rigid planar member having an image sensor mounted thereon, an optical assembly with a substantially rigid member and having an optical subassembly disposed thereon, a solderable surface formed on either the optical subassembly or the rigid planar member and defining a solder receiving interface, a solder material disposed on the solder receiving interface for bonding the subassemblies and a housing containing the optical and image sensor assembly.

95. A method for mounting an optical subassembly (12) of an optical reading or imaging device to an image sensor subassembly (14) of an optical reading or imaging device, said method comprising the steps of:

moving said optical subassembly and said image sensor subassembly in proximity with one another (page 5, lines 17-19);

aligning said optical subassembly with said image sensor subassembly (page 5, lines 17-22; page 6, lines 1-5); and

without a portion of said image sensor subassembly being in contact with a portion of said optical subassembly (page 18, lines 12-23; page 20, lines 1-3), soldering said optical subassembly and said image sensor assembly together using a solder material (page 12, lines 3-8).

This is a method claim reciting the steps of moving the optical subassembly and an image subassembly and an image sensor subassembly in proximity to one another, aligning the optical subassembly with the image sensor subassembly and, with a portion of the image subassembly being in connect with the portion of the optical subassembly, soldering the two together.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1 and 82 stand rejected under 35 U.S.C. 102(b) as being anticipated by Masuko et al. (U.S. Patent 5,023,447).

2. Claims 1, 2, 7, 8, 80 and 82 stand rejected under 35 U.S.C. 102(b) as being anticipated by Wise et al. (U.S. Patent 5,100,479).

3. Claim 31 stands rejected under 35 U.S.C. 102(b) as being anticipated by Kawaguchi (U.S. Patent 5,171,985).

4. Claims 59, 61-64, 66, 68-71 and 89-92 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kanaya et al. (U.S. Patent 5,155,401).

5. Claims 13, 15, 18, 23, 24, 32, 33, 35, 37, 46, 47, 49, 52, 53, 55, 57, 83, 86-88, 95, 96, 98, 101-103, 105 and 106 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kropp (U.S. Patent 5,902,997).

6. Claims 73, 74, 76-78, 93 and 94 stand rejected under 35 U.S.C. 102(b) as being anticipated over Christensen.

7. Claims 14, 16, 17, 19-22, 25, 34, 36, 48, 50, 51, 54, 56, 58, 84, 85, 97, 99, 100, 104, 107 and 108 stand rejected under 35 U.S.C. 103(a) as being obvious over Kropp.

8. Claims 60, 65, 67 and 72 stand rejected under 35 U.S.C. 103(a) as being obvious over Kanaya et al.

9. Claims 78 and 79 stand rejected under 35 U.S.C. 103(a) as being obvious over Christensen.

10. Claim 30 stands rejected under 35 U.S.C. 103(a) as being obvious over Kawaguchi.

11. Claims 3-6 and 45 stand rejected under 35 U.S.C. 103(a) as being obvious over Wise et al.

12. Claims 9-12 and 81 stand rejected under 35 U.S.C. 103(a) as being obvious over Wise et al. in view of Kawaguchi.

VII. ARGUMENT

Ground 1. Claims 1 and 82 stand rejected under 35 U.S.C. 102(b) as being anticipated by Masuko et al. (U.S. Patent 5,023,447).

The Masuko reference describes a photo-semiconductor module having a casing 30 to which a ceramic substrate 31 is soldered. In separate operations, a support arm 35 having a semi-spherical lens 36 attached thereto is soldered to the substrate 31, and then a photo diode chip 33 is also soldered to the ceramic substrate 31. This is accomplished with no requirement for accurately positioning the photo diode chip 33 with respect to the semi-spherical lens 36. The lens 36 is merely mounted above the photo diode chip 33 and at an angle of 45° relative thereto. It is then the next step in which the alignment is critical. That is, an optical fiber 41 is secured to the side wall of the casing 30, and "then the PD chip 33 accommodated in the casing 30 and the optical fiber 41 are optically coupled to each other" (column 5, lines 8-10).

This is substantially different from the appellant's invention wherein the relative placements of the optical subassembly and the image sensor subassembly are the critical issue. Referring to claim 1, the preamble recites a method for mounting an optical subassembly to an image sensor subassembly. In the Masuko et al., reference, this does not occur. Rather, both the support arm 35 with its semi-spherical lens 36, and the photo diode chip 33 are secured to a ceramic substrate rather than there being one mounted to the other as recited in claim 1. A further recitation in claim 1 recites the step of "soldering said optical and image sensor subassemblies together using a solder material". Again, in the Masuko reference, those elements are not soldered together but are rather each soldered to a ceramic substrate. Thus, not only does Masuko et al., not have the structural limitations as set forth in claim 1, but neither does it have the need to do so since the co-alignment of these two elements is not critical for the reasons discussed hereinabove.

In respect to the final rejection of claim 82 under 35 U.S.C. 102(b) as being anticipated by Masuko et al., claim 82 recites a further distinguishing feature which provides that, in addition to the two components at the time of the soldering step being free to move in either a vertical or horizontal direction as set forth in claim 1, the subassemblies are also free to move relative to each other in a direction normal to the two components. Thus, in addition to claim 82 being allowable because of its dependency on claim 1, which is considered to be allowable for the reasons

discussed hereinabove, claim 82 adds a feature which further distinguishes over the Masuko et al. reference.

Ground 2. Claims 1, 2, 7, 8, 80 and 82 stand rejected under 35 U.S.C. 102(b) as being anticipated by Wise et al. (U.S. Patent 5,100,479).

The Wise et al., reference shows an infrared detector 10 mounted inside a casing 12. Output leads 14 are connected to output pads 26 of the detector 10 at bonding regions 16 using a solder material. The output leads 14 typically connect the detector to processing circuitry. A window 13 in the casing 12 allows infrared radiation to strike the thermopiles 24 through a dielectric membrane 40 formed in aperture 22. In his explanation, the Examiner refers to the casing 12 as "an optical subassembly". Although the casing 12 has an opening or window 13 through which the infrared radiation is permitted to pass, it can not reasonably be considered "an optical subassembly" of the type intended by the applicant. That is, in the present case, the optical subassembly comprises a framework which holds a lens for focusing the light passing therethrough. The purpose and the structure of the present invention as recited in claim 1 is that of aligning the lens of the optical subassembly such that it coincides with the image sensor when the two subassemblies are interconnected.

Considering the recitation of claim 1 as discussed hereinabove regarding the step of soldering the optical and image sensor subassemblies together, in order for the Wise et al., reference to anticipate the invention as recited in claim 1, it would be necessary for the optical subassembly to not only include the casing 12 but also the leads 14, and for the image sensor assembly to also include the output pads 26, such that the optical subassembly is soldered to the image sensor assembly. The applicants believe that is an unreasonably broad and inaccurate interpretation of the teachings of the Wise et al., reference.

The positioning of the casing 12 in respect to the detector 10 is not critical as in the case of the present invention. Although the window 13 needs to be placed over the detector 10 such that the infrared radiation may pass through the casing 12, its exact positioning is not critical. In this regard, it should be noted that the aperture 22, which functions as the window through which the infrared radiation is detected, is probably more critical, and therefore the particular placement of the rim 20 with

respect to the thermopiles 24 is the relative positioning that is more closely controlled in accordance with the process as set forth in the Wise et al., reference.

In respect to the step of the soldering the output pads 26 to the pins 14, there is no mention of a step of aligning the respective elements nor the need to do so. Thus, one skilled in the art would simply understand that reference to teach that the soldering process was simply a way to electrically interconnect the leads 14 to the output pads 26, rather then as a method of interconnecting two elements that are being closely co-aligned.

For the reasons discussed hereinabove the applicants believe that the Wise et al., reference neither shows nor suggests the method as set forth in claim 1. The claims that are dependent on claim 1 recite further steps that would further distinguish over the Wise et al., reference.

In respect to the rejection of claims 80 and 82 in view of the Wise et al., reference, it should be recognized that, because of the dependent nature of these claims they should be patentable for the reasons discussed hereinabove. Further, they add the further features relating to the pin being of a substantially uniform diameter, and the hole being a through-hole, respectively, which are features that are not shown or suggested by the Wise et al. reference.

Ground 3. Claim 31 stands rejected under 35 U.S.C. 102(b) as being anticipated by Kawaguchi (U.S. Patent 5,171,985).

Claim 31 is dependent on claim 17 and is considered to be patentable for the reasons discussed below with respect to Grounds 5 and 7.

Ground 4. Claims 59, 61-64, 66, 68-71, 89-92 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kanaya et al. (U.S. Patent 5,155,401).

The Kanaya reference shows and describes a recorder motor having a coded disk 32 secured to the motor shaft with an image sensor 33 in close proximity thereto for detecting the rotational angle of the coded disk 32. The positioning of the coded disk 32 relative to the coded sensor 33 is accomplished by selectively positioning the coded disk 32 on the motor shaft, and by selectively positioning, and soldering, both the sensor 33 with respect to a circuit board 35, and the circuit board 35 with respect to the motor terminals 28 and 29.

Referring now to the Examiner's objections on the basis of Kanaya, the Examiner refers to the motor terminals 28 and 29 as being the solder receiving

interface between the printed circuit and the optical subassembly. Accordingly, the optical subassembly must include not only the disk 32 and its carrying shaft 17, but also the receiving member 39, the shaft 17, the bearings 15 and 16, the rotor 18, the rotor magnets 19, and the excitation coils 20 and 21. Inasmuch as these various elements are relatively moveable and not collectively rigid, the soldering of the circuit board 35 to the motor terminals 28 and 29 does not ensure that there will be no movement between the disk 32 and the image sensor 33.

Referring now to claim 59 and 66 as amended, the optical subassembly is recited as being substantially rigid, thus ensuring that once the two subassemblies are soldered together, there will be no movement between the image sensor and the optical element. This is to be contrasted with Kanaya wherein the structure between the motor terminals 28 and 29 and the disk 32 is relatively moveable and therefore not rigid.

In respect to claims 59 and 66, the Examiner suggests Kanaya, has a substantially rigid optical subassembly, even thought it includes a disk 32, a carrying shaft 19, receiving member 39, a shaft 17, bearings 15 and 16, a rotor 18, a rotor magnet 19 and excitation coils 20 and 21. The appellants believe that inasmuch as these elements are flexibly interconnected such that one part moves with respect to the other, they are not collectively a rigid subassembly.

<u>Ground 5</u>. Claims 13, 15, 18, 23, 24, 32, 33, 35, 37, 46, 47, 49, 52, 53, 55, 57, 83, 86-88, 95, 96, 98, 101-103, 105 and 106 are rejected under 35 U.S.C. 102(b) as being anticipated by Kropp (U.S. Patent 5,902,997).

The Kropp reference shows a method for obtaining proper spacing between a lens and an optoelectronic component. Mounted on a base plate 1 is an optoelectronic 2 having a plurality of optically active zones 4a-4d thereon. These optically optic zones are to be aligned with respective lenses 12a-12d on a lens body spaced therefrom. The proper relative positioning of the two components is obtained in one plane by coordinating an optically active zone 4e with a protuberance highest point 21, in the "A" direction (see Fig. 1), and in another plane by the engagement of the protuberances 18 and 19 with the face of the optoelectronic component 2 to obtain the proper spacial distance "B" as shown in Figs. 1 and 2 . Thus, unlike the present invention, the relative positioning of the two components is a fixed measured distance that will be a constant distance as determined by the length of the

protuberances 18 and 19. After the optoelectronic component 2 has its face engaging the protuberances 18 and 19 (thereby limiting any further relative movement between the two components), then the optoelectronic component is secured to the base plate 1 by an adhesive or solder applied at point 35, for example.

In respect to the 102(b) rejections on the basis of Kropp, the Examiner says with respect to that reference that, "the instant before the two subassemblies touch prior to soldering, the subassemblies can be moved freely in a vertical or horizontal direction". With this the appellants disagree. The protuberances shown at 18 and 19 of Fig. 1 and at 40a and 40b in Fig. 4 are integrally a part of the lens body shown at 10 and 44, respectively. The spacial distance between the lenses and the optically active zones, are established by the protuberances such that, at the time of the soldering process, the protuberances are engaged with the face of the optoelectronic components so as to not only prevent the optoelectronic component 2 from being moved any further toward the lenses, but also provide at least frictional resistance to relative movement in both the vertical and horizontal directions. This is in contrast to claims 13 and 46 of the present invention wherein there is no restriction on the relative movement between the two components (i.e. free movement) immediately prior to said soldering step. It is also contrary to claim 95 wherein it is recited that the two subassemblies are not in contact with each other.

The Examiner has also said in respect to the Fig. 4 embodiment that Kropp discloses "A method for mounting an optical subassembly of an optical reading device to an image sensor subassembly, the method comprising: inherently moving the optical subassembly 44, 45 and the image sensor subassembly 40 in proximity to one another; aligning the subassemblies; and without a portion of the image sensor subassembly being in connect with a portion of the optical subassembly in contact, soldering the subassemblies together. That, only the soldered bumps and solderable surface touch". The appellants disagree and believe that the Examiner is incorrect in this conclusion, since there does not appear to be any basis for it in the specification or drawings. In respect to the Fig. 4 embodiment of the Kropp reference, it should be recognized that because the annular markings 52A-52B are adapted to receive the protuberances 48A-48D therein, the freedom of relatively movement between the elements 40 and 44 are even more restricted than the Figs. 1 and 2 embodiments since, when the two protuberances 46a-46d are in position within the bearing regions

48A-48D, the lens 44 will not be moveable at all in the vertical or horizontal directions.

The Examiner further states that "Kropp further discloses (see Fig. 4) the solderable surface consisting of a pin (46) having a substantially uniform-diameter body". The appellants disagree. The element 46 in Fig. 3 which is misnumbered as items 40a and 40b in Fig. 4, is a convex protuberance and does not have a substantially uniform-diameter body but has a diameter that varies continually through its length. In this regard, the Examiner's comment with respect to "compared to the width of the subassembly, the pin has a substantially uniform-diameter", is not understood. In this regard the Examiners attention is drawn to column 5, lines 30 and 31 where it is indicated that, "the protuberances 46a-46d may preferably be constructed to be lenticular in shape".

Ground 6. Claims 73, 74, 76-78, 93 and 94 stand rejected under 35 U.S.C. 102(b) as being anticipated by Christensen (U.S. Patent 5,753,908).

The Christensen reference shows an imaging device including a retina board 80 upon which a linear photo sensor array 52 is mounted, with the board 80 being attached by screws 24 to a scanning carriage 10 that include lenses 20 and 22. The screws 24 pass through a pair of over sized holes 82 and 84 in the board 80 such that the board 80 can move relative to the scanning carriage 10 to allow adjustments for the first, second and third degrees of freedom as shown at 30, 32 and 34 of Fig. 5. As will be seen in Fig. 6, adjustments of the focus between the lens 22 and the photo sensor array 52 is made by moving the lens 22 in a fourth degree of freedom 36. Adjustment in the fifth degree of freedom 38 is obtained by movement of the retina board 50 by adjusting the screws 150 and 152. Of the five degrees of freedom, it is thus only the fourth degree of freedom which is comparable to the present invention, and as described hereinabove, Christensen only suggests that the lens 22 be positionally adjusted with respect to the photo sensor array 52. But he does not describe or suggest how that is accomplished or how those elements are positioned and fixed in place.

With regard to the 102(b) rejections on the basis of Christensen, as set forth in paragraph 10 of the Office Action, the Examiner appears to be stating that the printed circuit board 80 is a part of the optical subassembly 10. If one chooses this construction, then, as shown in Fig. 4, the sockets 90 and 100 which are soldered

into the printed circuit board 80, must also be considered part of the "optical subassembly". Then, there is no "solder receiving interface between the substantially rigid planar member and the optical subassembly" as suggested by the Examiner. The interface is rather by a way of "Pins in Carrier Type IC Socket" arrangement as described in lines 33-47 of column 5. That is, the solder interface is on the "optical subassembly" as defined by the Examiner, but it is not "between" the rigid planar member and the optical subassembly as recited in claim 73 of the applicant's claims.

Ground 7. Claims 14, 16, 17, 19-22, 25, 34, 36, 48, 50, 51, 54, 56, 58, 84, 85, 97, 99, 100, 104, 107 and 108 stand rejected under 35 U.S.C. 103(a) as being obvious over Kropp.

Each of the dependent claims 14, 48 and 97 recite that the step of forming a solderable surface includes the step of overmolding non-solderable material onto solderable material. The Kropp reference, on the hand, includes no such step. In column 5, lines 13 and 14, that reference provides that "The fixation of the lens carrier can be carried out by adhesive bonding or soldering. In the case of soldering, the soldering surfaces may be coated with a solderable metal that can be applied in structure fashion by planar methods". Thus, in addition to the substantial differences as discussed in the paragraph entitled Ground 5 above, the Kropp reference does not show or suggest this approach but would tend to teach away from a step of overmolding non-solderable material onto solderable material.

Ground 8. Claims 60, 65, 67 and 72 stand rejected under 35 U.S.C. 103(a) as being obvious over Kanaya et al.

Claims 65 and 72 recite the feature of one solderable surface being provided by a threaded screw. The Kanaya reference, on the other hand, does not show or suggest such a feature. Kanaya positions and solders the sensors 32 to a circuit board and the circuit board to the motor terminals 28 and 29. Clearly, none of the sensor, circuit board or motor terminals can reasonably be considered to be a threaded screw. Accordingly, this feature is not shown or suggested by the Kanaya reference and is therefore patentably distinctive thereover.

Ground 9. Claims 75 and 79 stand rejected under 35 U.S.C. 103(a) as being obvious over Christensen.

Claim 79 recites that "At least one solderable surface is provided by a threaded screw". In contrast, it will be seen in column 9, lines 47 and after of

Christensen that there are two different approaches for locking the integrated circuit package in place to the printed circuit board 80. The first is by placing solder paste in the sockets 90 such that the pins 72 and 64 are then locked in place in the sockets 90 and 100, respectively. The other approach is to have the pins 74, 78, 66 and 70 soldered directed to the printed circuit board rear surface 88. In neither of these approaches is a threaded screw involved. Thus, not only does Christensen not show or suggest this feature, it would tend to teach away from such a feature.

Ground 10. Claim 30 stands rejected under 35 U.S.C. 103(a) as being obvious over Kawaguchi.

Appellant's claim 30 which is dependent on claim 17, which in turn, is dependent on claim 13, recites the step of aligning optical elements of an optical assembly with imaging elements of the image sensor subassembly. Although Kawaguchi shows the aligning of a light emitting element 1 with a light receiving element 2, the method by which this is accomplished is not shown or suggested. The appellant's claim 30, on the other hand, includes the steps of claims 13 and 17 which involve forming at least one solderable surface on at least one of the subassemblies, moving the optical subassembly in proximity with the image sensor assembly and soldering the optical subassembly and image sensor subassembly together at an interface. The Kawaguchi reference, on the other hand, does not show any of these steps and, because of the substantial difference in structure and purpose, the steps would neither be obvious nor appropriate. For these reasons, the features of claim 30 are patentably distinctive over the Kawaguchi reference.

Ground 11. Claims 3-6 and 45 stand rejected under 35 U.S.C. 103(a) as being obvious over Wise et al.

Claims 3-6, which are dependent on claim 1, which is distinguishable over Wise et al. for the reasons discussed hereinabove, recite the further features of overmolding non-solderable material onto solderable material to form a solderable surface (claim 3), plating a solderable material onto a non-solderable material (claim 4), insert molding solderable material in non-solderable material (claim 5) and making a frame for the optical subassembly comprising essentially solderable material (claim 6).

In the Wise et al reference, on the other hand, none of these steps are taken nor suggested. Instead, the pins 14 are simply soldered to the output pads 26, and

the method by which this is accomplished is not discussed. In fact, this does not appear to be important since the soldering process is simply to interconnect the leads 14 to the output pads in an electrical connection. Thus, the Wise et al. reference would not only not show or suggest the steps as set forth in claims 3-6, but would rather teach away from such steps.

Claim 45, which is dependent on claim 1 and is distinguishable over the Wise et al. reference for the reasons set forth in Ground 2 above, recites the further step of aligning optical assembly and image sensors subassembly using a video monitor which displays an output inductive of an output of said image sensor subassembly. This feature is neither shown nor suggested by the Wise et al. reference. As discussed in the paragraph relating to Ground 2 above, the positioning of the casing in respect to the detector 10 is not critical and there is no showing of how this is done. Clearly, they do not use a video monitor. While the placement of the aperture 22 and the placement of the rim 20 with respect to the thermal piles 24 is critical, the manner in which they align those elements does not involve a video monitor. Accordingly, not only does the Wise et al. reference not show or suggest these features, it would lead one skilled in the art away from such an approach.

<u>Ground 12</u>. Claims 9-12 and 81 stand rejected under 35 U.S.C. 103(a) as being obvious over Wise et al. in view of Kawaguchi.

Claim 9, which is dependent on claim 7 which, in turn, is dependent on claim 1, which is patentably distinctive over the Wise et al. reference for the reasons discussed hereinabove with respect to Ground 2, recites the further feature of at least one solderable surface being in the configuration of a threaded screw. Referring to each of the cited references, the Wise et al. reference and the Kawaguchi reference clearly do not show or suggest such a feature. The Wise et al. reference shows the pins 14 being soldered to the output pads 26, and neither of these elements can in any way be reasonably considered to be a threaded screw. The Kawaguchi reference may involve the soldering of the light receiving element 2 to the lead 5-2 and the light emitting element 1 to the lead 5-1. Again, none of these elements can reasonably be considered to be a threaded screw.

Claim 10 recites the further feature of the solderable surface being in the configuration of a hole. Referring again to the Wise et al. reference, neither the pin 14 nor the pad 26 can reasonably be considered to be a hole. Similarly, in the

Kawaguchi reference, none of those elements can be reasonably be considered to be a hole. In each of these references, not only is a hole not shown or suggested, but it would not appear to be practicable in such structures.

Claims 11, 12 and 81 all recite the features of the through hole, and for the reasons discussed hereinabove, neither of the cited references taken individually or in combination show or suggest such a feature.

CONCLUSION

In view of the foregoing comments and discussions the appellants believe that the Examiner has not made a *prima facie* case for the unpatentability of the claims and that the claims are patentable distinguishable over the cited references.

The appellants therefore request that the rejection of the Examiner be reversed and that the appealed claim be allowed to issue.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0289.

Respectfully submitted,
WALL MARJAMA & BILINSKI LLP

Date: January 20, 2006

By: ____________________
Dana F. Bigelow
Reg. No. 26,441

DFB/cmh
Telephone: (315) 425-9000
Customer No.: 20874

VIII. CLAIMS APPENDIX

1. A method for mounting an optical subassembly of an optical reading device to an image sensor subassembly of an optical device, said method comprising the steps of:

moving said optical subassembly and said image sensor subassembly in proximity with one another; and

soldering said optical and image sensor assemblies together using a solder material, wherein at the time of said soldering step there is no contact between said optical subassembly and said image sensor subassembly that prevents free movement of said optical subassembly and said image sensor subassembly in either of a vertical or a horizontal direction.

2. The method of claim 1, further comprising the step of forming a solderable surface on at least one of said optical subassemblies or said image sensor subassemblies.

3. The method of claim 1, further comprising the step of forming a solderable surface on at least one of said optical subassemblies or said image sensor subassemblies, wherein said forming step includes the step of overmolding non-solderable material onto solderable material to form said solderable surface.

4. The method of claim 1, further comprising the step of forming a solderable surface on at least one of said optical or image sensor subassemblies, wherein said forming step includes the step of plating a solderable material onto a non-solderable material.

5. The method of claim 1, further comprising the step of forming a solderable material on at least one of said optical or image sensor subassemblies, wherein said forming step includes the step of insert molding solderable material in non-solderable material.

6. The method of claim 1, further comprising the step of forming a solderable surface on said optical subassembly, wherein said forming step includes

the step of making a frame for said optical subassembly comprising essentially solderable material.

7. The method of claim 1, further comprising the step of forming a solderable surface on at least one of said optical subassemblies or said image sensor subassemblies, wherein said forming step includes the step of making said solderable surface in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

8. The method of claim 7, wherein said at least one solderable surface is in the configuration of a pin.

9. The method of claim 7, when said at least one solderable surface is in the configuration of a threaded screw.

10. The method of claim 7, wherein said at least one solderable surface is in the configuration of a hole.

11. The method of claim 1, further comprising the step of forming a first solderable surface on one of said subassemblies and a second solderable surface in said other of said subassemblies, wherein said first solderable surface is made in the configuration of a pin driving a substantially uniform-diameter body, and said second solderable surface is made in the configuration of a through-hole, wherein said pin has a diameter smaller than said hole to allow positional adjusting of said optical subassembly relative to said image sensor subassembly.

12. The method of claim 1, further comprising the steps of forming a solderable pin on one of said subassemblies, and making a hole for receiving said pin on the remaining of said subassemblies.

13. A method for mounting an optical subassembly to an image sensor subassembly, said method comprising the steps of:

forming at least one solderable surface on at least one of said optical and image sensor subassemblies;

moving said optical subassembly in proximity with said image sensor subassembly to define an interface delimited by said at least one solderable surface of said optical subassembly or said image sensor subassembly; and

soldering said optical subassembly and said image sensor subassembly together at said interface, wherein said optical subassembly and said image sensor subassembly are configured so that said image sensor subassembly and said optical subassembly can be moved freely relative to one another in at least either of a vertical or a horizontal direction immediately prior to said soldering step.

14. The method of claim 13, wherein said forming step includes the step of overmolding non-solderable material onto solderable material.

15. The method of claim 13, wherein said forming step includes the step of plating a solderable material onto non-solderable material.

16. The method of claim 13, wherein said forming step includes the step of insert molding solderable material in non-solderable material.

17. The method of claim 13, wherein said forming step includes the step of making a frame for said optical subassembly comprising essentially solderable material.

18. The method of claim 13, wherein said forming step includes the step of making said solderable surface in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

19. The method of claim 18, wherein said at least one solderable surface is in the configuration of a pin.

20. The method of claim 18 wherein said at least one solderable surface is provided by a threaded screw.

21. The method of claim 18 wherein said at least one solderable surface is in the configuration of a hole.

22. The method of claim 13, wherein said forming step includes the step of making a first solderable surface in one of said subassemblies and a second solderable surface in said other of said subassemblies, wherein said first solderable surface is in made in the configuration of a pin having a substantially uniform-diameter body, and a said second solderable surface is made in the configuration of a through-hole having a diameter larger than said body.

23. The method of Claim 13, when said forming step includes the steps of forming a solderable pin on one of said subassemblies and a hole for receiving said pin on said other of said subassemblies.

24. The method of claim 13, wherein said moving step includes the step of aligning optical elements of said optical assembly with imaging elements of said image sensor assembly.

25. The method of claim 24, wherein said aligning step includes the steps of:

exposing said image sensor assembly to a predetermined test target; and

observing indicia representing electrical signals generated by said image sensor.

26. (Withdrawn from Appeal) An image sensor subassembly comprising:

a substantially rigid member;

an image sensor chip disposed on said substantially rigid member;

a solderable surface formed on said substantially rigid member, said solderable surface being of a configuration selected from the group consisting of a hole or pin for receiving in surrounding but not engaging relationship a corresponding pin o hole; and a solder material disposed between said pin and said hole.

27. (Withdrawn from Appeal) The image sensor subassembly of claim 26, wherein said solderable surface is made in an irregular configuration having an increased surface area per unit three dimensional space relative a smooth surface.

28. (Withdrawn from Appeal) The image sensor subassembly of claim 26, wherein said solderable surface is made in the configuration of a hole.

29. (Withdrawn from Appeal) The image sensor subassembly of claim 26, wherein said solderable surface is in the configuration of a pin.

30. The method of claim 17, wherein said moving step includes the step of aligning optical elements of said optical subassembly with imaging elements of said image sensor subassembly.

31. The method of claim 17, wherein said aligning step includes the steps of:

exposing said image sensor subassembly to a predetermined test target; and

observing indicia representing electrical signals generated by said image sensor.

32. An optical subassembly comprising:

a substantially rigid member;

an optical element disposed on said substantially rigid member; and

a solderable surface formed on said substantially rigid member, said solderable surface being of a configuration selected from the group consisting of a hole, pin, or threaded screw.

33. The optical subassembly of claim 32, wherein said solderable surface is made in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

34. The optical subassembly of claim 32, wherein said solderable surface is made in the configuration of a hole.

35. The optical subassembly of claim 33, wherein said solderable surface is in the configuration of a pin.

36. The optical subassembly of claim 33 wherein said solderable surface is provided by a threaded screw.

37. The optical subassembly of claim 33, wherein said at least one solderable surfaces includes four solderable surfaces formed about a periphery of said image sensor.

38. Cancelled

39. Cancelled

40. Cancelled

41. Cancelled

42. Cancelled

43. Cancelled

44. Cancelled

45. The method of claim 1, wherein said method further comprises the step, after said moving step, of aligning said optical subassembly and image sensor subassembly using a video monitor which displays an output indicative of an output of said image sensor subassembly.

46. A method for making an optical and image sensor assembly, said image sensor assembly comprising an optical image sensor subassembly and an image sensor subassembly, said method comprising the steps of:

aligning said optical subassembly and said image sensor subassembly relative to one another without contacting said optical subassembly and said image sensor subassembly against one another in a manner that prevents free movement of said subassemblies relative to one another in either of a vertical or a horizontal direction; and

when said optical subassembly and said image sensor assembly are properly aligned, securing said optical subassembly and said image sensor subassembly together.

47. The method of claim 46, further comprising the step of forming a solderable surface on at least one of said optical subassembly or said image sensor subassembly, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

48. The method of claim 46, further comprising the step of forming a solderable surface on at least one of said optical assembly or said image sensor assembly, wherein said forming step includes the step of overmolding non-solderable material onto solderable material to form said solderable surface, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

49. The method of claim 46, further comprising the step of forming a solderable surface on at least one of said optical or image sensor subassembly, wherein said forming step includes the step of plating a solderable material onto a non-solderable material, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

50. The method of claim 46, further comprising the step of forming a solderable material on at least one of said optical or image sensor subassembly, wherein said forming step includes the step of insert molding solderable material in non-solderable material, and wherein said securing step includes the step of

soldering said optical subassembly and said image sensor subassembly together using a solder material.

51. The method of claim 46, further comprising the step of forming a solderable surface on said optical subassembly, wherein said forming step includes the step of making a frame for said optical subassembly comprising essentially solderable material, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

52. The method of claim 46, further comprising the step of forming a solderable surface on at least one of said optical subassembly or said image sensor subassembly, wherein said forming step includes the step of making said solderable surface in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

53. The method of claim 52, wherein said at least one solderable surface is in the configuration of a pin.

54. The method of claim 52, when said at least one solderable surface is in the configuration of a threaded screw.

55. The method of claim 52, wherein said at least one solderable surface is in the configuration of a hole.

56. The method of claim 46, further comprising the step of forming a first solderable surface on one of said optical subassembly or image sensor subassembly and a second solderable surface in said other of said optical subassembly or image sensor subassembly, wherein said first solderable surface is in made in the configuration of a pin, and said second solderable surface is made in the configuration of a hole, wherein said pin has a diameter smaller than said hole to

allow positional adjusting of said optical subassembly relative to said image sensor subassembly, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

57. The method of Claim 46, further comprising the steps of forming a solderable pin on one of said optical subassembly on image sensor assembly, and making a hole for receiving said pin on the remaining of said subassemblies, and wherein said securing step includes the step of soldering said optical subassembly and said image sensor subassembly together using a solder material.

58. The method of claim 46, further comprising the step of aligning said subassemblies using a video monitor which displays an output indicative of an output of said image sensor.

59. An imaging device comprising:

an image sensor subassembly including an image sensor mounted on a printed circuit board;

a substantially rigid optical subassembly, said optical subassembly including an optical element disposed on a substantially rigid member;

at least one solderable surface formed on either of said printed circuit board or said optical subassembly defining at least one solder receiving interface between said printed circuit board and said optical subassembly; and

solder material for bonding said subassemblies disposed at said at least one solder-receiving interface.

60. The device of claim 59, further including a housing encapsulating said device, said device partially defining a feed path.

61. The device of claim 59, further including a housing encapsulating said device, said housing including a handle.

62. The device of claim 59, wherein said at least one solderable surface is made in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

63. The device of claim 59, wherein said at least one solderable surface is made in the configuration of a hole.

64. The device of claim 59, wherein said at least one solderable surface is in the configuration of a pin.

65. The device of claim 59, wherein said at least one solderable surface is provided by a threaded screw.

66. An imaging device comprising:

an image sensor subassembly including an image sensor mounted on a printed circuit board;

a substantially rigid optical subassembly, said optical subassembly having a single receive optical axis and including an optical element disposed on a substantially rigid member;

at least one solderable surface formed on either of said image sensor subassembly or optical subassembly defining at least one solder receiving interface between said image sensor subassembly and said optical subassembly; and

solder material for bonding said subassemblies disposed at said at least one solder-receiving interface.

67. The device of claim 66, further comprises a housing encapsulating said device said housing partially defining a feed path for receiving documents.

68. The device of claim 66, further comprising a housing encapsulating said device said housing including a handle.

69. The device of claim 66, wherein said at least one solderable surface is made in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

70. The device of claim 66, wherein said at least one solderable surface is made in the configuration of a hole.

71. The device of claim 66, wherein said at least one solderable surface is in the configuration of a pin.

72. The device of claim 66, wherein said at least one solderable surface is provided by a threaded screw.

73. An optical reading device comprising:

an optical and image sensor assembly including

an image sensor subassembly including an image sensor mounted on a substantially rigid planar member,

an optical subassembly, said optical subassembly including an optical element disposed on a substantially rigid member,

at least one solderable surface formed on either of said optical subassembly or said substantially rigid planar member defining at lease one solder receiving interface between said substantially rigid planar member and said optical subassembly,

solder material for bonding said subassemblies disposed at said at least one solder-receiving interface,

a housing, said optical and image sensor assembly being disposed in said housing.

74. The device of claim 73, wherein said housing partially defines a feed path and wherein said device is a document reading device, for reading indicia from documents transported along said feed path.

75. The device of claim 73, wherein said housing includes a handle, and wherein said device is a hand held optical reader.

76. The device of claim 73, wherein said at least one solderable surface is made in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

77. The device of claim 73, wherein said at least one solderable surface is made in the configuration of a hole.

78. The device of claim 73, wherein said at least one solderable surface is in the configuration of a pin.

79. The device of claim 73, wherein said at least one solderable surface is provided by a threaded screw.

80. The method of claim 8, wherein said pin comprises a substantially uniform-diameter.

81. The method of claim 10, wherein said hole is a through-hole.

82. The method of claim 1, wherein there is further no contact between said subassemblies which prevents free relative movement between said assemblies in a direction normal to each other.

83. The method of claim 13, wherein said subassemblies are further configured to be freely moved in a direction normal to each other immediately prior to said soldering step.

84. The method of claim 19, wherein said pin is of a substantially uniform-diameter.

85. The method of claim 21, wherein said hole is a through-hole.

86. The method of claim 46, aligning step further includes the step of moving said subassemblies without contact in a manner that prevents free movement of said subassemblies in a direction normal to each other.

87. The method of claim 52, wherein said pin has a substantially uniform-diameter body.

88. The method of claim 55, wherein said hole is a through-hole.

89. The method of claim 63, wherein a hole is a through-hole.

90. The method of claim 64, wherein said pin comprises a substantially uniform-diameter body.

91. The device of claim 70, wherein said hole is through-hole.

92. The device of claim 71, wherein said pin has substantially uniform-diametered body.

93. The device of claim 73, wherein said hole is a through-hole.

94. The device of claim 78, wherein said pin comprises a substantially uniform-diametered body.

95. A method for mounting an optical subassembly of an optical reading or imaging device to an image sensor subassembly of an optical reading or imaging device, said method comprising the steps of:

moving said optical subassembly and said image sensor subassembly in proximity with one another;

aligning said optical subassembly with said image sensor subassembly; and

without a portion of said image sensor subassembly being in contact with a portion of said optical subassembly, soldering said optical subassembly and said image sensor assembly together using a solder material.

96. The method of claim 95, further comprising the step of forming a solderable surface on at least one of said optical subassemblies or said image sensor subassemblies.

97. The method of claim 95, further comprising the step of forming a solderable surface on at least one of said optical subassemblies or said image sensor subassemblies, wherein said forming step includes the step of overmolding non-solderable material onto solderable material to form said solderable surface.

98. The method of claim 95, further comprising the step of forming a solderable surface on at least one of said optical or image sensor subassemblies, wherein said forming step includes the step of plating a solderable material onto a non-solderable material.

99. The method of claim 95, further comprising the step of forming a solderable material on at least one of said optical or image sensor subassemblies, wherein said forming step includes the step of insert molding solderable material in non-solderable material.

100. The method of claim 95, further comprising the step of forming a solderable surface on said optical subassembly, wherein said forming step includes the step of making a frame for said optical subassembly comprising essentially solderable material.

101. The method of claim 95, further comprising the step of forming a solderable surface on at least one of said optical subassemblies or said image sensor subassemblies, wherein said forming step includes the step of making said solderable surface in an irregular configuration having an increased surface area per unit three dimensional space relative to that of a smooth surface.

102. The method of claim 101, wherein said at least one solderable surface is in the configuration of a pin.

103. The method of claim 101, wherein said at least one solderable surface is in the configuration of a pin having a substantially uniform-diametered body.

104. The method of claim 95, when said at least one solderable surface is in the configuration of a threaded screw.

105. The method of claim 101, wherein said at least one solderable surface is in the configuration of a hole.

106. The method of claim 101, wherein said at least one solderable surface is in the configuration of a through-hole.

107. The method of claim 95, further comprising the step of forming a first solderable surface on one of said subassemblies and a second solderable surface in said other of said subassemblies, wherein said first solderable surface is in made in the configuration of a pin having a substantially uniform-diametered body, and said second solderable surface is made in the configuration of a through-hole, wherein said pin body has a diameter smaller than said through-hole to allow positional adjusting of said optical subassembly relative to said image sensor subassembly.

108. The method of claim 95, further comprising the steps of forming a solderable pin on one of said subassemblies, and making a through-hole for receiving said pin on the remaining of said subassemblies.

IX. EVIDENCE APPENDIX

No evidence is presented.

X. RELATED PROCEEDING APPENDIX

There are no related appeals or interferences.